SCOPE OF WORK AND SERVICES

REQUEST FOR PROPOSAL FOR

SUPPLY, ERECTION AND COMMISSIONING OF CONSOLE, VIDEOWALL, ACOUSTICS PROOF INTERIOR FOR SEMICRYO TEST CONTROL CENTRE

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1. INTRODUCTION:

This document defines the scope and basic requirements for Supply & installation of Operator consoles, Video walls, acoustic proof interior works for Test Control Centre (TCC) of Semi Cryo Integrated Engine Test Facility at IPRC, ISRO, Mahendragiri, Tamil Nadu. The Test Control Centre building has rooms viz, Control room and Visitor's gallery. The interior work has to carried out for these rooms.

2. BRIEF DESCRIPTION:

Command room is in ground floor with high bay construction and visitor's gallery is in first floor.

The Test Control Centre built up civil structure has the following specifications

Building Details	
Command room	Area : 22,000 x 14,350 mm^2 Height : 9 mtr
Visitors Gallery	Area : 25,350 x 10,175 mm^2 Height : 5.5 mtr
Wall paneling Area	1350 m^2
False Ceiling Area	700 m^2
Seating capacity of visitors gallery	220
Operator consoles in Control room	36 Nos

The Test Control Centre will be mainly used for the following applications

- Control and monitoring of test stand activities
- Remote Control of Pre-test, post test and hot test activities
- Display of trend graphs, parameters display and test stand views in LED video wall
- Operators and Visitors will be viewing the test activities through LED video wall

The CAD drawing of the ground floor and first floor plan is given in Annexure: 1.

Interior design shall be focused in terms of Aesthetics, Ergonomics and Functionality. Various aspects should be considered while designing Control room interior so as to create pleasant working environment, considering physiological aspects such as line of sight and field of vision and cognitive factors such as concentration and perceptivity.

3. REQUIREMENT:

Test Control Centre work consists of supply and installation of

- Operator consoles/ control desk – 36 Nos
- LED Video walls
- Wall Paneling for the Command room, lobby and Visitors gallery
- False ceiling for the Command room and Visitors gallery
- LED lights with electrical fittings and wiring along the false ceiling
- Fixing of AC diffuser and grill in ceiling
- Operator Chairs: Rolling - 70 Nos
- Visitor Gallery Chairs fixed – 180 Nos
- Visitor gallery single seat sofa type - 40 Nos

Console and Interior design shall be of the state of art technology, better system design, sustainable solution, functionally superior, aesthetically pleasing and designed on Ergonomic principles to improve operator's well-being and reduce ergonomic risk factors.

Interior design shall reflect human factors requirements including the following:

- Satisfactory environmental conditions for operator personnel including acoustics effects, air flow, temperature and humidity and precautionary measure under uncontrolled conditions (like fire) beyond acceptable limits.
- Adequate space for personnel and equipment for the movements and activities required to perform during operation and maintenance, under both normal and emergency conditions.

- Adequate visual / auditory status information and other communication links between personnel and equipment under normal and emergency conditions.
- Adequate illumination for the performance of operation, control, maintenance.
- The control room shall be built as per the criteria of "Human Factor Engineering" to improve the efficiency of the operators and provide them Fatigue free working environment.

4. SCOPE OF WORK:

The scope of the work includes designing, 3D rendering, engineering, supply & installation of control centre interiors such as wall paneling, false ceiling, lighting, operator consoles / control desk, LED video walls, operator chairs at TCC.

The supplier shall supply all the items and installation and commissioning at site shall be completed within the delivery period of **9 months**.

5. QUOTATION:

The contractor shall quote all the required items as per the design and specification.

Quotation shall be submitted on **two bid basis** viz. Technical & Commercial bid and Price bid. Quotations that are satisfying our technical specifications and commercial terms & conditions only will be eligible for opening price bid.

The first bid shall contain the technical and commercial aspects and bill of material without the price.

Contractor shall provide the following technical details in the quote.

- Proposal on the interior design for Command room, lobby and visitors gallery
- 3D rendering of the building for interior
- Proposal for the exterior masonary façade wall design

- Audio video solutions for the Command room, visitors gallery to attain best AV performance for the indenting application
- Analytical / simulation results of acoustics
- Control desk/ console layout
- Design and dimensional drawing of consoles
- Specification of all the supply materials
- Data sheet and catalogue of LED video walls
- LED Video wall arrangements and mounting structure design
- Catalogue of furniture
- Certificates for the proof of quality of item

Vendor selection Criteria:

The following details also shall be provided along with quote to qualify the vendor.

- Submission of various options of control desk layout for client's approval, strictly complying to ISO 11064.
- Certificate for ISO 9001-2008 quality certification and proof of quality system implementation in Manufacturing processes for at least 2 years.
- Certificate for ISO 14001 for Environment Management System.
- Certificate for OHSAS 18001 for Occupational Health and Safety.
- ASTM E-84 certificate.
- FSC: Forest Stewardship Council. The desk manufacturer should be a FSC Certified manufacturer from a reputed certifying agency.
- Manufacturing Unit/Capability: If asked, supplier to arrange factory and product inspection before placement of order, to ensure that the vendor is capable of in-house production of the ordered goods.
- Vendor shall submit the details and catalogues with pictures/images of previous installations for reference.
- Printed Catalogues and Locations of Demo rooms to be furnished.
- Architects experience and previous project execution details to be provided.

- Green guard (UL) Certification: Entire product to comply with minimum indoor air quality standards as per ANSI/BIFMA M7.1-2007 to be submitted along with the technical BID.
- ANSI BIFMA X5.5 Certified console (from a reputed agency and that too on all parameters).
    - Concentrated Functional Load Test.
    - Distributed Functional Load Test.
    - Concentrated Proof Load Test.
    - Distributed Proof Load Test.
    - Stability Under Vertical Load Test.
    - Tests must be based on ANSI BIFMA X5.5 -2014 standards applied to the proposed product solution.
- RoHS certificate to be enclosed by the console manufacturer.
- To ensure uniformity, consistency & quality in final product the desk manufacturer should have In-house Powder Coating Plant, metal manufacturing and wood processing plant.
- Proven Track Record
    - The desk manufacturer must produce documents proving that they have executed order(s) with sleek type consoles.
    - The console manufacturer or supplier should have supplied such console with Green guard (UL certified) & BIFMA X5.5 (all parameters) certifications to any customer in past five years.
    - Execution of integrated control room

The second bid shall contain bill of material with prices.

6. DETAILED ENGINEERING:

The detailed engineering shall be completed within 3 months and detail engineering documents shall be submitted with the following details for approval. The party shall submit various designs /proposals for interiors and console (**minimum 5 state**

of art designs with various conceptual design) to the department during detail engineering phase and department will finalize the design. Department approved design shall be used for realization. The following shall be provided during detail engineering.

- Design for false-ceiling
- Design for wall paneling
- Detailed layout including console arrangements
- Design for consoles
- Pre-Fabrication drawing of consoles
- Selection of Speaker type and rating
- Layout of speaker locations
- Design for acoustics performance analysis –Reverberation Time
- Software simulation results for acoustics criteria
- Measurement of Sound Absorption Coefficient in Reverberation Room test report from reputed agency
- Design for false ceiling lighting
- Design with air conditioning diffuser and grill arrangements
- Design for video walls layouts
- Design and Engineering of video wall mounting structure
- Design for Audio, Video and Data requirements for LED video wall
- 3-D Rendering incorporating all the above
- Material specification
- Architectural drawings
- Detailed BOM including all specification
- Schedule of activities
- Operator console positioning layout and design
- Furniture models with catalogues

- The complete solution shall confirm to high standard of engineering as mentioned in the document, meeting the specified codes, standards and designs.
- Design shall be for performing 24X7 operations under the specified environmental condition.
- Workmanships shall be of highest standards meeting the specified requirement/purpose.
- Ground floor and First floor plan is given in Fig-A, Fig- B

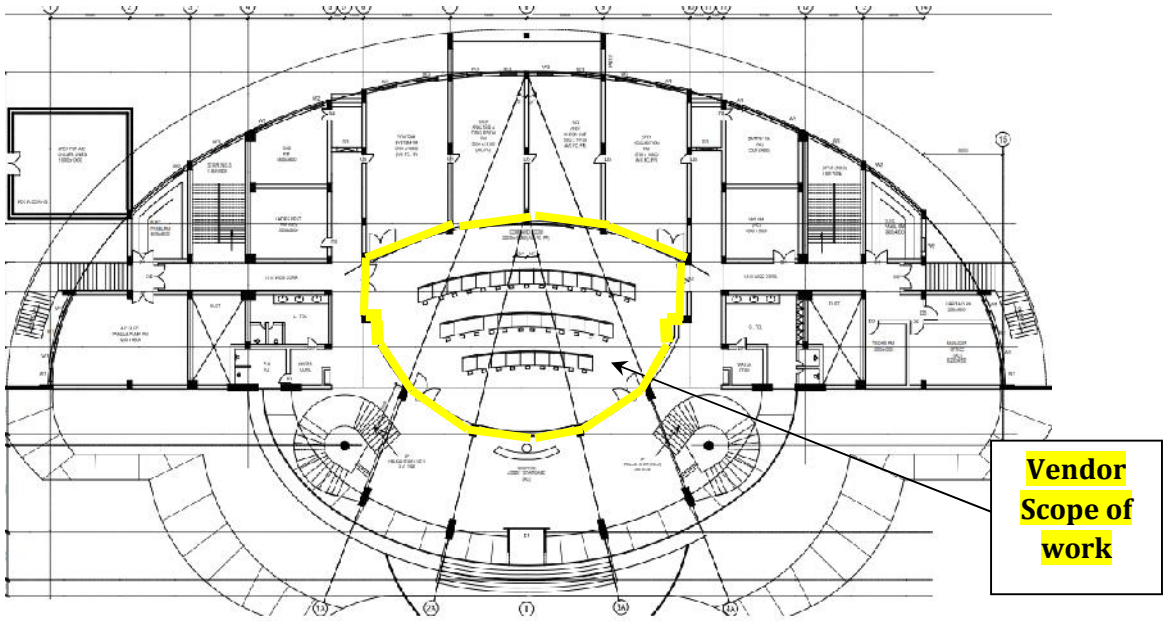


Fig : A Ground Floor Plan

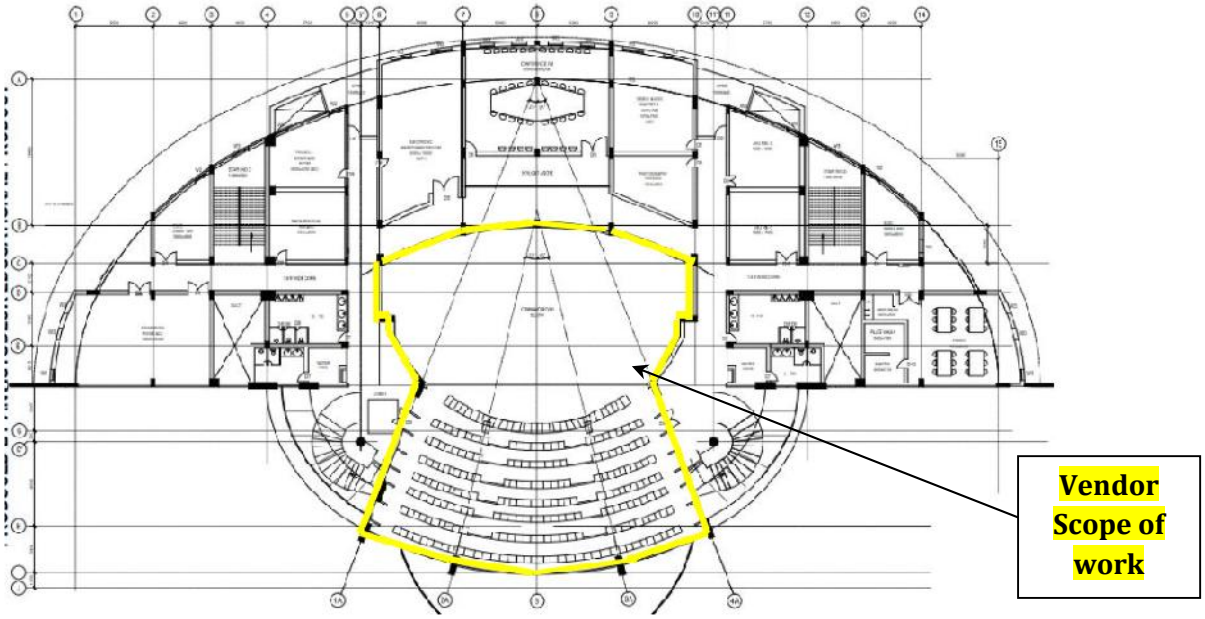


Fig : B First Floor Plan

6.1. Samples:

Samples of the material/components which shows workmanship, shall be provided to department for evaluation and approval.

- Work surface of console with ergonomic nosing
- Color shades
- Key board tray and mounting kits
- Monitor arm
- Wall paneling materials
- False ceiling materials

- Interior works and console fabrication shall be executed as per the detailed engineering after approval from the department.

7. CODES AND STANDARDS:

All equipments supplied and work performed shall confirm to the latest issues of relevant standards and codes including addenda, revisions and supplements published up to the date of contract award.

- Control desk layout for client's approval shall strictly comply to ISO 11064.
- Green guard (UL) Certification for console to comply with minimum indoor air quality standards as per ANSI/BIFMA M7.1-2007.
- ANSI BIFMA X5.5 Certified for console

8. SUPPLY:

All the items as per the finalized specification shall be supplied to site for erection & commissioning within the stipulated time.

9. ERECTION & COMMISSIONING:

9.1. False Ceiling

False ceiling shall be done as per the finalized design for Command room and Visitors gallery of TCC. Vendor shall supply the required false ceiling materials and installation shall be completed within the stipulated time. False ceiling material quoted shall be of Standard/ reputed brands. Minimum specifications are provided here, however the detail specification will be finalized during detailed engineering as per the finalized design requirement.

9.1.1. Features

- The ceiling shall possess good aesthetics and sound absorption.
- Ceiling type shall be selected to reduce background noise levels and reverberation times within spaces and to enhance speech intelligibility.
- False ceiling material shall have sound absorption coefficient approx 0.6.

- Noise reduction coefficient of materials selected for interior shall be greater than 0.7 for better acoustic performance.
- Reverberation time shall be < 0.6 sec.
- False ceiling shall be of Baffle Metal Ceiling type for Command room and plank metal ceiling type for Visitors gallery.
- It shall have the provision for integration of building services like fire detection / fighting system. Fire detection / fighting system is free issue material by Department.
- Removable type self inter lockable Powder Coated sheet metal panels of GI/CRCA shall be provided.
- The panels shall have compressed polystyrene as an infill material.
- Aluminum Composite sheets shall be used to cover the gaps between modular ceiling and walls.
- Powder coating shall follow ASTM standard test.
- Fire retardant material shall be selected for acoustic requirements
- LED Light fittings shall be incorporated into ceiling at appropriate locations to have a uniform appearance.
- AC grills suitable for the ceiling shall be provided along the metallic ceilings and to be linked to the existing AC ducts.
- The LED lights shall be fitted along the ceiling
- The fixing of ceiling panels at different level and the coloring scheme shall be finalized during detailed engineering.
- Sample design of the false ceiling is given in Fig: 1, Fig : 2, however the design will be finalized during detailed engineering.
- **Make** : Armstrong, India Gypsum, Gyproc India, Boral or equivalent

Fig : 1 - Baffle Ceiling in Command room

Fig : 2 – Plank Ceiling in Visitors Gallery

9.1.2. Baffle ceiling specification:

- The baffles shall be made up of powder coated GI/MS sheet.
- Baffle planks shall be bend through CNC to have dimensions as 225X50mm / 100X25mm / 80X30mm. Center to Center distance shall be minimum 150mm.
- Ceiling Baffle tile shall be of minimum 0.7 mm thick powder coated sheet metal.
- Carrier of minimum 0.50 mm GI, powder coated to match baffle colour shall be used.
- Ceiling shall have arrangement to fix, hang and lock the baffles of required sizes and at required intervals.
- Punched carrier would be of minimum size 35x20x35mm bent channel with holes for suspension and fixing secondary channel.
- The baffles top edge shall have a flange to fix in the carrier profile.
- C Channel of minimum 1.6 mm Thick GI Sheet with Laser cut profiles.
- Suspension: The carriers would be placed at every 1200mm (maximum) and suspended by means of a secondary angle.
- Proper anchor fastener shall be provided to hold the false ceiling support structures.
- Top Clamp shall be of minimum 1.0 mm thick GI Sheet for holding the threaded rod.
- Tile Top clamp shall be of minimum 1.0 mm thick GI Sheet snap fit clamp.
- End Cap shall be of minimum 0.7 mm thick GI
- Finish: Epoxy Powder coated.
- Color: As per approval
- Entire structure shall be powder coated MS.
- Metal Strip where baffle planks will be hanged should be sleek & sturdy.
- All necessary mounting accessories to be provided for installation of panel

9.1.3. Metallic plank Ceiling Specification

- Ceiling shall be Dual layer, flat plank ceiling.
- Planks shall be interconnected to form Curvilinear/Reverse Curvilinear or Straight profiles.
- Acoustic modular metal false ceiling of powder coated panels. Perforated and non-perforated metal panels (2′ X 4′) made through CNC laser cutting, bending & punching.
- Panel shall comprise of micro perforation for making false ceiling acoustically sound with fire rated acoustic fleece.
- Plank shall be made from 0.6mm thick GI powder coated sheet of approved shade and sizes.
- The material shall have the following properties
  - ✓ NRC (Noise Reduction Co-efficient) > 0.7
  - ✓ Light reflectance >65%
  - ✓ Fire retardant
  - ✓ Humidity Resistant RH 90%
  - ✓ Hot dipped galvanized steel
  - ✓ Baked Polyester Paint surface
- All necessary mounting accessories to be provided for installation of panel

9.1.4. Calcium Silicate Board ceiling specification

- Plain Calcium Silicate Acoustic Boards for false ceiling with minimum 12mm thick shall be used.
- Structure for underside shall be of suspended grid formed of GI perimeter channels.
- Calcium Silicate Board shall be of a mixture of Portland cement, fine silica, special cellulose fibers and selected fillers to impart durability, toughness, fire and moisture resistance.

- Expansion after expose to the water for 24 Hr.: 0.12%, Noise Resistance: B38, Water absorption by Weight: 34%, Fire resistance: BS 476 incombustible A1 Class.
- All necessary mounting accessories to be provided for installation of panel

9.1.5. MS Structure

- MS structural support shall be provided for suspending false ceiling if required.
- Fabrication of the MS Structure and supply also in the scope of vendor.

9.1.6. AC works

- AC ducts are already routed and erected in the ceiling for Command room and visitor's gallery by Department.
- AC diffuser and grills shall be mounted in the ceiling by vendor as per the finalized false ceiling design.
- AC grills and diffuser will be free issue material by department
- Existing AC duct routes may be modified/ altered if required, to meet the false ceiling design requirement.

9.1.7. Positioning

- The erection of false ceiling material shall be as per manufacturer's recommended guidelines.
- Suspended metal frame false ceiling shall be fixed with G.I. Perimeter channels, along the perimeter of ceiling and screw shall be fixed to wall.
- G.I. Intermediate channels shall be suspended with G.I. Angle fixed to G.I. expansion fastener.
- Ceiling section shall be fixed to intermediate channel with connecting clips.
- Ceiling panels shall be screw fixed to the ceiling section with appropriate screws.
- Screw fixing to be done mechanically with drilling machine & suitable attachment.
- The panels shall be perfectly jointed & finished.

- Speakers and Fire detectors shall be fixed at appropriate location as per the finalized design.
- Necessary arrangements shall be done to mount the speakers and fire detectors.
- Fire detectors supply is under department scope.
- ***Necessary scaffolding required shall be arranged by the vendor to work on elevated levels. Department will not provide scaffolding for any erection works.***

9.2. Wall Paneling

Wall paneling shall be done as per the finalized design for Command room, Visitors gallery and lobby area wall of TCC. Party shall supply the required wall paneling materials and installation shall be completed within the stipulated time.

Wall paneling material quoted shall be of Standard/ reputed brands. Minimum specifications are provided here, however the detail specification will be finalized during detailed engineering as per the finalized design requirement.

- Wall paneling shall be state of art design with a combination of **Straight, Curved, 3D, Lattice, Printed metal paneling.**
- Conventional wooden cladding, painting, gypsum, Plaster of Paris, fabric type paneling shall not be considered.
- The visible walls inside the Command room and visitor's gallery are to be paneled. The design and texture shall be finalized during detailed engineering.
- Panels shall be of micro perforation for making the cladding and partitions acoustically sound proof. Acoustic grade fire retardant acoustic fleece shall be fitted.
- Panels shall be fixed using snap fitting or any other dry cladding system.
- Panel design should ensure that when the tiles need to be removed for service maintenance of Lighting & AC ducts & for cleaning the tile itself. The risk of tile damage should be minimized.

- Fire retardant acoustical fleece to be pasted on the metal ceiling so as to achieve better acoustic levels.
- The panels should be so designed that the operators should not be distracted during routine operations. Panel should be non reflective/glare free.
- There should be insulating material between frame & tile to eliminate rattling sound during vibration.
- Paneling shall be of removable type, self inter lockable metal panels.
- The metal panels shall be fixed on structure made of 1.6 mm thick MS channels bent over automatic punching or bending using CNC machine.
- The paneling shall have the properties like
    - Resistance to extremes of weather exposure and temperature.
    - Very low coefficient of expansion.
    - Can be cleaned using detergents.
    - Surface shall have superior flatness, smooth surface.
- Sample designs of wall paneling is given in Fig-3 and Fig-4, however the design will be finalized during detail engineering.
- Civil construction is completed in all respects and already putty is applied on walls.
- Vendor shall apply necessary wall putty, plastic emulsion paint on the wall if required due to civil reworks by vendor before wall paneling for perfect finishing.
- **Make** : Armstrong, India Gypsum, Boral or equivalent

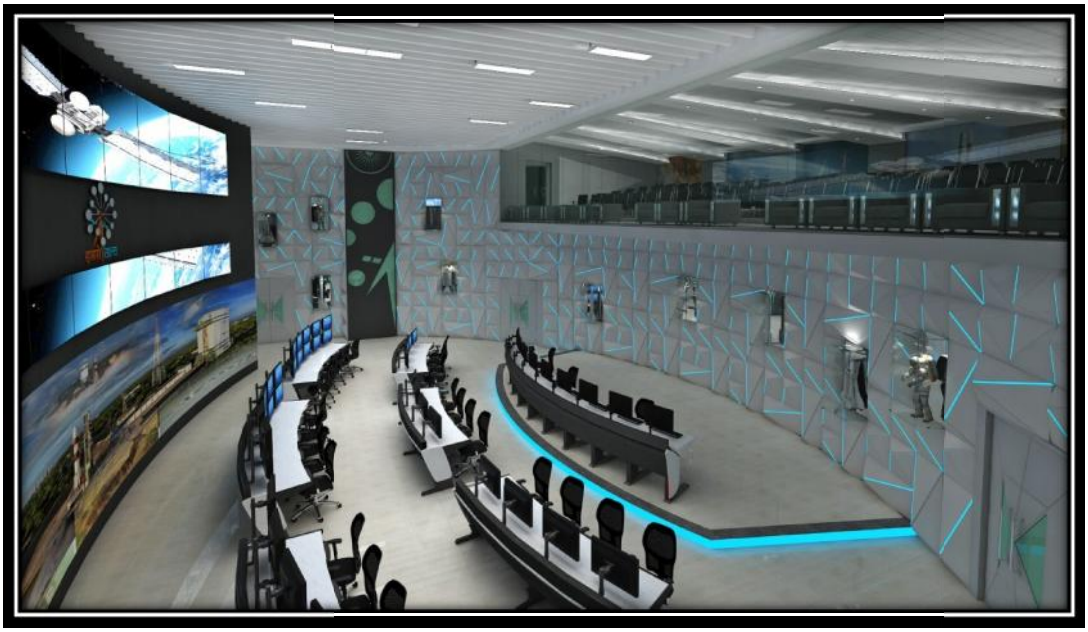


Fig : 3 – Wall paneling in Command room

Fig : 4 – Wall paneling in Visitors Gallery

9.2.1. Design & Material Specification for Paneling

- Removable type self inter lockable metal panels of Preformed Textured Hot dip galvanized strips and sheets of low carbon steel coated on one side with rigid polyvinylchloride (PVC) film and on the other side with a coating based on cross linkable polyester resins (minimum sheet thickness 0.6mm & PVC Coating 0.15mm).
- Paneling shall be of specially designed combination of perforated and non-perforated panels through CNC laser Cutting, bending & punching.
- Panel shall be of minimum 0.75mm thick galvanized metal of approved color.
- Panels shall be designed to achieve shape and design as per the design consultant.
- Panels shall be fixed using hook fitting on structure. Overall system thickness for paneling shall be approx. 70mm to 110mm.
- Panel design shall comprise of hexagonal perforation for making paneling and partitions acoustically sound.
- 3D metal Paneling:
  - ✓ 3D walls shall be provided to give exclusive and state of art look to the Command room.
  - ✓ Tile shall be of 3D shape with illuminated strip lights. This strip shall be continuous running LED lights (diffused effect) to add the aesthetic appeal to the wall.
  - ✓ The paneling shall be with inbuilt lighting solution
  - ✓ The designer LED Neon strip light shall create a homogeneous light effect to break the monotony of the 3D wall paneling. The strip to have ultra-high lumens efficiency and the same shall be achieved by encapsulating DIP LEDs with an enhanced PVC mixture.
  - ✓ LED strip light shall have the provision to adjust the illumination level.

- ✓ PVC pre-coated GI sheet of minimum 0.6mm thickness and PVC coating of 0.15mm.
- ✓ Panel shall provide better thermal, electrical insulation as compared to normal GI panels. It shall be non-reflective/glare free.

- Straight / Curved Metal paneling:
  - ✓ The cladding panels shall be made up of combination of two sheets locked and riveted together and polystyrene shall be used as infill to achieve strength and acoustics. The front tile (PVC pre-coated metal sheet) shall be perforated/ non-perforated as per the design requirement and the back tile (Powder coated 0.6mm GI sheet) shall be designed in such a manner that it fits on the back portion of the front tile. Once the tiles are fitted together, then these shall be manually riveted. These tiles shall be bent through CNC machine punched & laser Cut to achieve perfection.
  - ✓ Panel shall be of straight /curved type as per design requirement.
  - ✓ Front Panel: PVC pre-coated GI sheet (sheet thickness: 0.6mm and PVC coating: 0.15mm)
  - ✓ Back Cover: Powder coated GI sheet. (sheet thickness: 0.6mm with powder coating:)
  - ✓ Width – Approx 300mm to 1200mm (in multiples of 150mm).
  - ✓ Height- Approx 150mm to 750mm (in multiples of 150mm).
  - ✓ Thickness- 10mm to 15mm for perforated tiles with acoustic fleece without back cover
    25mm to 30mm for non-perforated tiles with back covers
  - ✓ The panels shall be hooked on the uprights. Panels shall have integrated hooks (which shall be cut and bend on high precision laser machines).
  - ✓ The panels shall have minimum gap of 5mm between two tiles (on vertical and horizontal edges) so that the tiles can be installed and replaced easily if required.

- ✓ The hooks of the panels shall have a length of minimum 20mm (for the top hook) and 10 mm (for the bottom hook), so that these panels are firmly held on the upright position.
- ✓ The panel shall have Hook in arrangement (With gravity lock).

- Lattice metal Paneling:
  - ✓ The properties of the panel shall be similar to metal panel.
  - ✓ The tile size shall be as per the design requirement. The front tile shall have laser cut designs (as per approval) and another tile shall be fitted into it to have Highlighter view. Combination of these two tiles shall provide a designer look.
  - ✓ The aim is to provide a contemporary look to the Command room two side walls.
- Printed metal paneling:
  - ✓ Designer Paneling with Printed Metal panel with powder coat finish of 0.6mm.
  - ✓ Metal panels shall be fixed on structure made of 1.6 mm thick MS channels bent over automatic punching and bending CNC.
  - ✓ The panel material properties shall be same as metal paneling.
  - ✓ Images with high resolution shall be printed on the metal panel.
- All necessary mounting accessories to be provided for installation of panel

9.2.2. Structure Design:

- Structure shall be made from heavy duty powder coated modular steel frame (minimum sheet thickness of 1.5 mm) and shall allow uninterrupted flow of wires/cable/tubes of dia. 25mm.
- Structure shall be securely grouted from wall, roof and floor. It shall be made up of minimum 1.6mm thick vertical Slotted rolled C sections (Upright) and horizontal rolled 'C' connectors. Grid of desired dimension shall be formed by Vertical and horizontal sections having 50mm pitch.

- Floor Mounting:
  - ✓ C channels of minimum 3mm thick shall be welded together to form a 'I' section having minimum height of 150mm. This I section shall be welded on 3mm thick MS grouting plate.
  - ✓ This assembly shall be grouted on the floor with the help of Anchor Fasteners.
  - ✓ These Floor Mountings shall be the base support to the vertical uprights.
  - ✓ Proper marking and leveling shall be ensured before proceeding with any floor grouting.
- C Section (Upright) fixing:
  - ✓ The Uprights shall be mounted over the floor mountings and shall be connected by C connectors made up of 1.0mm to 3mm thick cold rolled 'C' sections.
  - ✓ The installation to be carried out with Uprights securely fixed to the floor slab by means floor mountings.
  - ✓ The uprights shall be firmly held with L shaped wall mounts made up of minimum 2 mm thick MS sheet duly powder coated. One portion of L mount shall be grouted with wall.
  - ✓ The L clamp and the upright will be bolted together with bolts.

- End Cap:
  - ✓ C shaped tile of minimum 0.75mm thick shall be bolted on the extreme end Uprights to hide the grid structure, if required.
- Corner Cap:
  - ✓ On extremes ends of Command room the wall connector (L- profile) shall be fixed on the perimeter walls. This L-section shall be snap fitted and then bolted to the walls.

9.2.3. Material Testing/Certification:

- Product Specific Mandatory Requirement
  - ✓ Copy of Test certification for ASTM E84 (from UL) for the surface burning characteristics of wall paneling tiles to be submitted along with the bid. This is mandatory requirement from Fire safety point of view.
- PVC pre-coated sheet:
  - ✓ Fire rating and Low flame spread: EN ISO 11925-2, EN 13823 & ASTM E-84
  - ✓ Food gradeEU10/2011
- Core material (compressed polystyrene):
  - ✓ Acoustic test: 9301/ ISO: 140/ASTM 413, ASTM C 578.
- Powder coating
  - ✓ Adhesion test: EN ISO 2409 (2 mm)
  - ✓ Impact resistance test: ASTM D 2794 (5/9′ ball)
  - ✓ Flexibility test: EN ISO 1519
  - ✓ Salt spray test: 600 hrs.
  - ✓ Resistance to humid atmosphere test: DIN 50017.

9.2.4. Feature:

- Raw material for tile & powder coating should not affect environment, vendor to provide necessary test certificate.
- Color should not fade over 10 years.
- No sagging
- Easy and quick installation
- Low cleaning effort
- Vendor to demonstrate one portion of wall paneling & ceiling at their premises before dismantling & shipping to site.
- 100 % modular design. Fabrication shall be carried out at vendor's site and installation shall be done at site. Only minimum cutting, chipping work is allowed in department site.
- The tile shall be bend resistant.

- Panel should comprise of perforation for making the cladding/paneling acoustically sound. Min 20% panels shall be perforated.
- Gluing, screwing, ACP, Laminates are not allowed.
- Panel design should ensure that when the tiles need to be removed for service maintenance of Lighting & AC ducts & itself cleaning, the risk of tile damage is minimized.

9.3. Wall paneling in Lobby area

- Wall paneling to be done on the wall of Lobby area. The design shall be pleasing and attractive. Paneling design shall represent a unique theme / concept and shall be attractive.
- The specifications are as per section 9.2.
- Wall paneling shall be done on the wall in between Door D2 of lobby/staircase.

9.4. Wall paneling in Exterior walls

- Wall paneling to be done on the masonry facade of exterior wall. The design shall be pleasing and attractive.
- Wall paneling shall be with ACP material of minimum 4 mm thickness.
- The design shall withstand wind speed of 120Km/hr and gust speed of 200km/hr.
- Design to be finalized during detail engineering.
- All necessary mounting accessories to be provided for installation of panel

9.5. Control room Decorators:

- To decorate the Command room, Visitor's gallery and foyer area party shall suggest decorative 3D models / flower vase/ paintings to add better ambience to the Control centre.
- **The party shall quote this as optional item**.

9.6. Lighting:

- Lighting Solutions with LED which offers excellent energy saving and maintenance free operation shall be provided.

- The luminaire shall have a slim design which is suitable for recessed mounted application. Powered by long lasting LED light source and high efficiency optical system, the luminaire shall offer a uniform and uninterrupted lighting.
- Energy Efficiency recessed Mounted LED luminaire suitable for grid ceiling with Lumen Output of 2200 Lumens with constant current electronic driver shall be considered.
- The illumination level inside the control center shall be 500 Lux minimum.
- Dim light shall be provided for visitor's gallery. Intensity level shall be controllable.
- Emergency light shall be provided in control room and visitors gallery.
- The arrangements and specification shall be finalized during detailed engineering
- Individual switches are required for 3 nos of light fittings.
- Alignment and grouping of the lamps to be made such that the illumination level shall be controllable.
- Recommended make of the switches are Anchor, ROMA, Legrend, Schnider, Havells.
- Wiring and cabling between the switches and the light fittings to be done and the wires shall be routed through conduits and cable managers.
- The specification of the LED light are given below, however the detailed specification will be finalized during detail engineering.

9.6.1. LED based modular round ceiling light

Make	: Havells/ Philips/ OSRAM/ Zumtobel/ Wipro
Light source	: LED
Lumen output	: 2200 Lumens
Light color	: 6500K
Power consumption	: 12-22W
Voltage	: 220V-240VAC, 50Hz

Driver : Integrated driver
Lifetime : 30000 burning hrs. (At L70)
CRI : >80

9.6.2. LED based modular Square ceiling light

Make : Havells/ Philips / Wipro/ OSRAM/ Zumtobel
Light source : LED
Lumen output : 4000 lumens
Light color : 3500- 6500K
Power consumption: 25 -38W
Voltage : 220V-240VAC, 50Hz
Driver : Constant current driver
Lifetime : 35000 burning hrs. (At L70)
CRI : >80

9.6.3. LED based Strip Light

Make : Havells/ Philips/ Wipro /OSRAM/ Zumtobel
Light source : LED
Lumen output : 840 lm/Mtr
Light color : 3000K/6000K
Power consumption: 9.8 W/Mtr.
Voltage : 12V AC 50Hz
Optics : Sand-blasted matt finish reflector
Color : White
Lifetime : 40000 burning hrs. (At L70)

9.6.4. LED Dim Light

Make : Havells/ Philips/ Wipro /OSRAM/ Zumtobel
Light source : LED
Power consumption: 24-32W
Voltage : 220V-240VAC, 50Hz
Driver : Constant current driver

9.6.5. Cove Light

Make	: Havells/ Philips/ Wipro /OSRAM/ Zumtobel
Light source	: LED
Voltage	: 220V-240VAC, 50Hz
Type	: Continuous rail of LED light

9.6.6. Wiring works for Ceiling Lights

- For ceiling wiring, inter looping shall be done and switches shall be provided at appropriate operation levels.
- The wiring shall consist of PVC insulated copper conductor stranded flexible FRLS wires of 1100 volts grade of insulation.
- The wires shall be routed through metallic conduits.
- Minimum size of copper conductor shall be 2.5 sq. mm for lighting and 4 sq mm for power. Color code shall be maintained for the entire wiring installation as per standards. Red/Yellow/Blue color for individual phases. For the all single phases, Color code viz. Red for phase, Black for neutral and Green for earthing.
- Appropriate ferrule shall be used in both the side (LDB Side & Switches Side)
- Light Fixture shall have 3 Wires: Phase, Neutral & Earth individually and if there is a need of another wire for Dimming/Dynamic Lighting purpose then suitable provision shall be provided.
- Existing wiring for lights done by Department from false ceiling to Distribution boxes can also be used for fixing the ceiling lights if adequate, with minor modifications.
- The wiring scheme shall be finalized during detail engineering

9.6.7. Switches & Sockets

- Compliance to stringent quality norms, Dual shutter mechanism for easy & better fitment, Wide & flat switch knob for easy operation. FR grade polycarbonate with high impact resistance, shock proof & UV rays stabilized shall be provided.

Switches and sockets shall be of reputed brands like Havells/ Philips/ Wipro /OSRAM

9.7. Door

- Frameless tempered clear glass Double door of 12mm thick shall be provided for the control room. Size: 1800mm x 2200mm
- Door shall be with door spring and locking arrangements and both way handle and patch fittings.
- Specifications: Tempered glass formed by heating glass to the softening point in a horizontal tempering stove, and then quickly cooling it.
- Make : Saint Gobain

9.8. Consoles

9.8.1. Features

- The Command room is to be equipped with state of the art consoles for providing SCADA / HMIs for Command room, strictly complying to latest ISO ergonomic norms, sustainable, functionally superior, CPU Free, aesthetically pleasing and to improve operator's well-being, reduce ergonomic risk factors and complying to HFES Norms.
- Standard office type, panel, cubicle type walls/partitions, post and open furniture type consoles are not acceptable. Modular Sleek metal type consoles are required for TCC.
- Equipment mounting: Console shall be designed in such a way to mount All-in-one PC for SCADA system, Thin PC based video monitoring system, printers, Intercommunication units, switches, headphone, wireless station etc. These consoles will be operated and monitored by engineers of ISRO during testing of rocket engines pertaining to different projects.

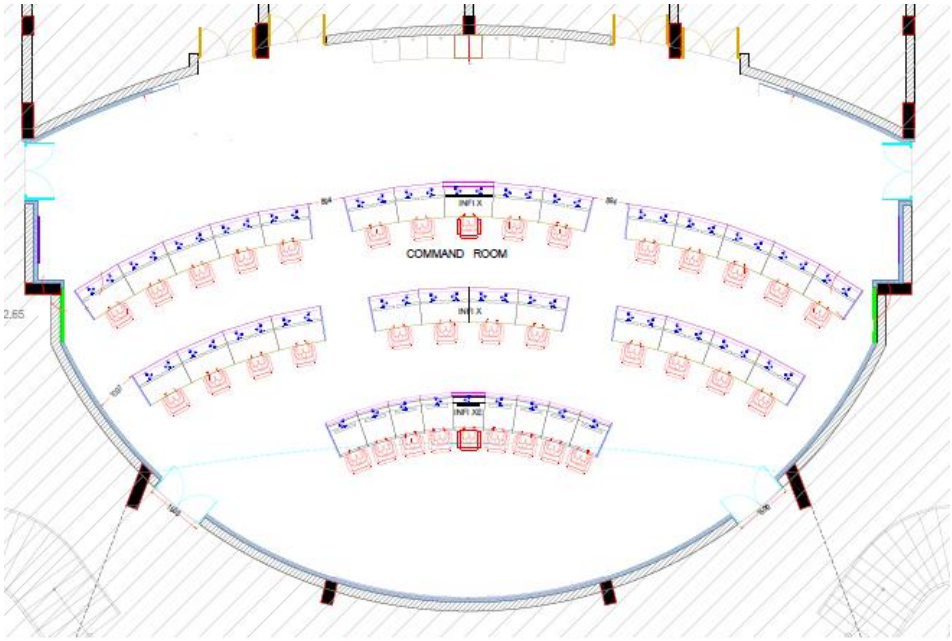


Fig: 5 Console arrangements

- The proposed layout for the 36 numbers of operator consoles is given in Fig.5. The consoles are to be positioned in 3 rows as per the layout. Proposals with better arrangements are also acceptable.
- Number of operator consoles to be assembled in rows and columns are shown in the layout. First row shall have 15 consoles, second row 12 consoles and third row 9 consoles.
- Each console in first two row shall be designed to mount two numbers of 24" monitors, auxiliary equipments like intercom, walkie talkie and equipments like power supply, Ethernet switch.
- Each console in last row shall be designed to mount one number of 24" monitor, intercom, walkie talkie and switches (key switch, emergency stop switches etc)
- The dimensions of mounting equipments like IP based intercom, walkie talkie and switches will be provided during detail engineering.

- The consoles shall have integrated corners & curved layouts design for optimal sightline and good aesthetics.
- The entire desk should be free from any sharp edge as per standard HSE norms.
- Monitor arms shall be fitted on extruded heavy duty aluminium slat walls.
- Slat walls of min 5 kg / meter weight shall be provided so that no sagging takes place in the life time. The slat wall shall be of one single piece (per 3/5 segments).
- The desk shall have sufficient knee space (min 550mm) and foot space (min 600 mm) and it should provide sufficient workspace with minimal footprint.
- The vertical leg should support passage of wires and easy accessibility through snap fit / hang on / magnetic formed metal covers.
- The consoles shall have modular structure design to facilitate equipment retrofits in the future without requiring major modifications to the structure or exterior element.
- The control desk shall house KVM equipment's/extenders, DIN Rail mountable Ethernet switches, SMPS power supplies, Power Distribution Unit. All the cables to be taken into the cabinet through desk legs to ensure completely hidden wire management.
- Sliding type keyboard trays shall be provided for each work station units.
- SCADA and Video monitors of 24" size, console mount switches, Telephones, intercom stations, head phone, wireless station to be provided for each operators.
- The console shall have cable management system with separation for running power & Data cable with good isolation.
- Shall be designed with vertical and horizontal cable trays to allow for continuous cable management between the cabinets.
- Ventilation: Front and Rear shutters shall have hexagonal /rectangular/circular designer perforations for provision of Airflow for cooling and heat dissipation effect.

- The console structure, sub structure and frame must form a freestanding unit independent of exterior cladding.
- Overall feel of the console shall have a floating feel with min.2"lifted cabinets from ground resting on leg with die cast/steel foot. The cable shall be routed through the hollow leg/ conduits.
- The console shall withstand normal wear and tear for daily operations of control center.
- Slide kits where ever appropriate (including keyboard drawers) shall be of ball bearing type.
- All the fasteners and screws and alignment components shall be good quality.
- Distribution boards (Legrand / Havells make) with 5A socket 6 Nos and with LED indication and ON/OFF switch to be provided for each console.
- Each console shall have MCB rated for 10A (Legrand / Havells make).
- The console shall have earthing provision in structure for ensuring the body electrically grounded
- All bolts must be of SS material to avoid rust due to environment. Remaining hardware shall be Nickle Plated with RoHS certificate.
- **Preferred Makes:** Winsted, Pyrotech Workspace, Evans
- Detailed CAD 2D & 3D drawings of console and equipment layouts shall be provided during detail engineering
    - ✓ Isometric views
    - ✓ cabinet interior layouts
    - ✓ 3D view with different color combination
    - ✓ Positioning of consoles and viewing to display units with persons seated in chairs.
- Minimum specification for consoles is provided in this document however, the design and specification will be finalized during detail engineering.

9.8.2. Work surface

- Over all depth of work surface shall be 800mm
- Work surface depth for operator use shall be minimum 450 mm
- Surface to floor height shall have 750 mm provision for floor leveling adjustments
- The static load shall be 50lb/linear ft or better to bear higher loads.
- The supplier shall furnish various shades of color and selection will be based on the matching with interiors panels will be specified at the time of detailed engineering.

Fig: 6 Console View

- The material of the working surface shall be Acrylic Solid Surface/ high-pressure solid composite material
  - ✓ Acrylic Solid Surface of 12 mm thick with base made up of minimum 25 mm thick laminated medium density fiber board with High Pressure scratch resistant, fire retardant laminate finish. Front edge shall be moulded Polyurethane edging on profiled wooden top.

- ✓ Optional quote for console can be provided with Work surface made up of Starlite material made of high pressure solid composite, post formed in a mold, with layers of aluminum sheets in between. Sheets of Starlite must be used in 12 mm thickness with 1, 2 or 3 aluminum layers.

- The surface shall be fire retardant, Insulated, Water Proof, Scratch resistance and high hardness.
- Solid Surface shall be homogeneous material throughout the depth, which compliance to Green guard.
- The table top should be of monolithic design with 40-50mm slant height towards the slat wall.
- The work surface must be in continuous curvilinear shape to maintain the aesthetic appeal of the design.
- Front ergonomic edge shall be of moulded (same material) which gives comfort to wrist/palm during working hours. It should not obstruct during operations. Shape of the Edge shall have an ergonomic slant with min 50 mm in depth. This is to give a grand look and maximum comfort.

9.8.3. Shutters

- The shutters shall be made of Preformed Textured Hot dip galvanized strips and sheets of low carbon steel coated on one side with rigid polyvinylchloride (PVC) film and on the other side a coating based on cross linkable polyester resins (sheet thickness 0.6mm & PVC Coating 0.15mm).
- Shutters should be supplied with high quality Foam Filter to avoid dust and dirt to enter the equipment cabinet.
- Tray type, straight panel type, conventional door designs shall not be acceptable.
- The shutter tile shall be ASTM E-84a (UL certified only) for surface burning characteristics.

- Shutters shall be of press to close type. They shall remain parallel to the table top with help of gas spring and concealed hinges, when opened. The Gas spring shall be made of steel with nickel plating.

9.8.4. Monitor Base and Arm

- Monitor arm shall be fixed on anodized Aluminum slat walls.
- Suitable flexible arms moveable in all directions (swivel/tilt/rotate) shall be provided for monitors and compatible with 75&100 Vesa Standard. For horizontal adjustment, arms shall be fitted on extruded aluminum profile supported by die cast/steel supports. Aesthetically pleasing monitor base and arm shall be provided. Arrangement for arm extension and tilting facility shall be provided for all monitors.
- The monitor arm shall have good aesthetics and elegant finish with Pan & Tilt adjustment mechanism (Pan: ±30 degree and Tilt: ±20 degree).
- The monitor arm shall have the capability to bear a weight of atleast 20kgs to hold a 24 inch diagonal All-in-one PC.
- The monitor arm shall have the capability to bear a weight of atleast 40kgs to hold two nos of 24 inch diagonal All-in-one PCs in V-shape.
- The design of Monitor arm, assembly and mounting drawings shall be submitted to department for approval.

9.8.5. Structure/ Frame work

- Control desk shall be of modular construction type. The structure frame shall consist of extruded aluminum/modular steel top and bottom horizontal beams and vertical support tensioned together to form an integrated, finished curvilinear shaped frame. The vertical and horizontal support shall be made of minimum 2mm thick of 6063T6 aluminum alloy/2mm steel. Spray type pretreatment shall be followed.

- The power cable from the UPS DB (Main and redundant) will be provided through conduits below the false flooring and shall be connected to each operator console.
- The data cable and video cables from conduits inside false flooring shall be connected to each operator console.
- The interconnection or equipment, power and network cabling for each operator station and console are to be carried out.
- Structure shall be made of heavy duty Extruded Vertical and Horizontal Aluminium profiles of 6063T6 grade. The Extrusions shall be duly powder coated with 40+ micron over all surfaces.
- Structure should be rigid enough to withstand BIFMA X5.5:2014 tests. Certificate of BIFMA X5.5 (on all parameter) from an approved and reputed testing agency to be attached.
- All bolts must be SS to avoid rust and remaining hardware shall be Nickle Plated with RoHS certificate.
- All sheet metal parts must be finished with a durable, black, electrostatic powder coating with average application of 60-90 microns over all surfaces.
- Pre-treatment process shall not generate sludge or heavy material.
- The supplier to perform following tests during inspection: -
    - Adhesion test : ISO 2409
    - Impact test : ASTM D 2794 : 40kg
    - Conical mandrel test : ASTM D 522
    - Scratch test : IS 101-1964
    - Salt spray (FOG) test : ASTM B 117 : 600 hrs
- To allow future extension and expansion a weld free system to be proposed. Interconnecting joints should not be visible.

- The structure should be rigid enough to withstand BIFMA X5.5. The structure should allow easy assembly of Hinged Shutters, Slat wall, Gland Plate, Monitor arms in extremely rigid manner.
- Grouting of the console is not allowed for BIFMA test and during site installation.
- Standard office type cubicles, panels and open furniture types with supporting posts will not be acceptable.

9.8.6. Side Legs:

The end panels at the extreme end of consoles shall have complementing designs and shall be finalized during detailed engineering. End panels shall be made up of acrylic solid surface with base made up of 18mm E1 grade MDF with thermo-fused lamination. It shall have low formaldehyde content, Density 700 kg/m3 and Fire Class: 1 as per BS 476 part 7.

- The legs shall serve as integrated channels to route cables from floor to the cabinet.
- The extended foot shall be made of 2-3 mm heavy duty anodised die-cast aluminium / 2mm formed stainless steel. It shall be designed to provide access to wiring cavity for easy flow of wire from the floor to the Side aesthetic leg and then to cabinet.
- The leg shall have inbuilt rubber grommets for safety of cables.
- All the fasteners should be hidden and nuts/bolts shall not be visible on the exposed surface.

9.8.7. Modular rear walls

Modular rear walls shall be made of heavy duty extruded aluminium profile with better aesthetic appeal allowing for various viewing levels and privacy. Conventional office type slat wall shall not be accepted.

- Modular walls shall be made of approx 2mm-6mm thick extruded Aluminum (6063T6 aluminum alloy).
- Weight per meter: min 5 Kg
- Shall be designed in such a way that no joints or gaps are visible in the entire width of the console.
- Load bearing capacity shall be min 30 kg per meter.
- It should have linear slots running throughout the length to accept modular components (slat wall mounting system, telephone arms, pen holders, paper holders).
- It should have high Load bearing capacity.
- No buckling when arms are fully extended
- No screws should be visible when joining table top to the Slat wall.

9.8.8. Electricals

- Each console shall be equipped with individual power (230 VAC) distribution unit. The Electrical power distribution unit shall be capable of being switched on/off and provide safe supply to all the consuming equipment individually. The console should be electrically earthed for all the body part which are conductive.
- Power supply socket should be dual type i.e. Universal type.
- It shall be a part while testing for Green Guard Certificate.
- Necessary terminal blocks shall be provided to wire instrumentation equipments (24V DC).

9.8.9. Cable Routing Arrangement

- Designed with vertical and horizontal cable trays to allow for continuous cable management between the cabinets.

9.8.10. Illumination

- Service light should be provided inside the cabinet enclosure for maintenance of equipment with provision of manual on/off switch.
- The illumination of service lights shall be such as not to interfere with the vision of the operator sitting in front of the console.
- LED tube light of 14 Watt and its fittings shall be provided.

9.8.11. Ergonomics

- Consoles shall be designed in accordance with the ergonomics standards and accepted human factors guidelines of ISO (9001),ANSI,BIFMA&CSA
- The console design shall be with high quality ASS for work surface to avoid scratches.
- The external work surface edge (nosing) should have an ergonomic, sloped edge to ensure operator comfort and eliminate contact stress.
- The layouts of consoles shall have curved designs.

9.8.12. Sustainability Requirements

- Total recyclable content shall be greater than 50%.
- All metal components shall be 100% recyclable.
- All materials shall be free of hexavalent chrome, CFC's, and PDBE's.
- Adhesives used shall be solvent free and free of any hazardous air pollutants.
- Metal parts shall be powder coated and finished with a durable VOC-free finish which is applied in a process that generates low levels of recyclable waste.

9.8.13. Checklist for Certificates, Norms etc.

- Compliance report to BIFMA X5.5 (on all test parameters) by a Reputed test facility.
- Certificate for ISO 9001
- Certificate for ISO 14001

- Certificate for OHSAS18001
- Greenguard (UL) Certification : ANSI/BIFMA M7.1-2007 Compliance: Entire desk to comply with minimum indoor air quality standards as per ANSI/BIFMA M7.1-2007.

9.8.14. Testing Methods (As per Standard Norms)

To be shown during Inspection or BID time as per the Project Owner / client requirement.

- Drop Test
- Abrasion Test
- Conical Mandrel
- Powder Hardness test
- Load Bearing Capacity of Desk

9.9. Display System

9.9.1. LED Video Wall:

- Vendor shall supply the Video wall as per the specification and has to be installed and tested at site.
- Video wall shall be provided for:
  - ✓ Size : 14 m (L) x 5 m (H) of Area : 70 Sq.m with Direct view LED technology of front access
- Necessary controller and software to configure the video wall shall be supplied.
- Mounting fixtures from the same video wall manufacturer shall be provided to mount the Video wall and the fixtures shall be mounted/ flushed on the wall. Video wall access shall be from front and the gap between wall and video wall shall be minimum approx. 100-300mm including fixtures.
- Party shall provide training to department Engineers at Site for the following on video wall
  - ✓ Installation of software

- ✓ Configuration of controller
- ✓ Configuration/ customization of the display as per the requirement
- ✓ Maintenance of the system

- Party shall provide proper operation manual in English to the Department for video wall.
- Mounting/fixing/alignment of the tiles shall be done with proper magnetic tools.

Technical Specification of fine pitch Direct View LED Video wall		
Sl. No.	**Description**	**Specifications**
1.	Video Wall Size	14 meters x 5 meters
2.	Display Technology	Indoor SMD LED
3.	Gap between modules	Seamless
4.	Pixel Pitch	2.5 mm
5.	Pixel Configuration	3-in-1 (1R1G1B)
6.	Max Calibrated Brightness	>800 Nits (cd/m^2)
7.	Aspect Ratio	16:9
8.	Contrast Ratio	5000:1
9.	Viewing Angle	H: 160°, V: +80°/-70°
10.	Refresh Rate	Min 3200 Hz
11.	Scan Rate	1/15
12.	Color Temperature	3200 – 9300K
13.	Inputs	HDMI/DVI(HDCP),RJ45
14.	LED Life Span (50% brightness)	1,00,000 hours
15.	Cabinet Design	Die cast Aluminium
16.	Colours	≥14 Bit
17.	LED Make	Epistar/Cee/Nich /Silan
18.	Voltage	AC 240 V @ 50Hz
19.	Power Consumption	40 Watts (typical)
20.	Service	Front access only
21.	Control System	8th Generation, Full color
22.	Transmission Distance	10-100m
23.	Certifications	UL, FCC, CE, EMC RoHS
24.	Acoustic Noise	Fanless operation

25.	Mounting arrangement	Curved
26.	IP rating	IP 30
27.	Mounting Fixtures	To be provided with standard reputed make company fixtures to mount the Video wall in curved wall surface to have better seamless integration. The mounting fixtures shall be designed with proper engineering. Mounting frame shall be made of steel / Aluminium structure
28.	Warranty	1 Year
29.	Preferred Make	**Christie / Planar / Barco**

Mounting fixture design to be provided to the department for approval.

9.9.2. Controller

General requirements:

Controller shall be capable of managing multiple display walls (video walls) using standard IP network. The system should use H.264 network video and audio streams to carry all content, providing an open and compatible system that can work with external hardware and software environments, including network cameras for security and surveillance.

The system must be future expandable and capable of driving from one to many discrete displays. The system must be able to guarantee perfect synchronization between displays in any single display wall. Multiple display walls must be able to be managed by the system administrators.

The system must support both audio and video signals, network display streams, still images, network surveillance cameras, and web content, played out on a display wall and on desktop systems, with multiple users having simultaneous access to content in the system.

The controller inputs should be capable to take 24 Nos direct DVI inputs of resolution of up to 1920 x 1200 from each server/workstation in the Command

room, encode them to H.264 stream – which could be presented on the video wall in any combination, either full screen or as a part of a single display. The controller should also be able to directly stream IP H.264 based inputs on the wall without using any separate encoders, where the same device should be able to Encode/Decode. The controller should also have capability to cut any part of the displayed data, and paste it on any part of the wall. This controller should also have a capability to save the layouts thus created as a scenario, and recall them through the wall management software – or through any control device by a single click. It is important that the controller should be able to replicate the input streams on the same display wall/ any other display wall which is on the same network – connected to the controllers.

The system should be simple to install and configure with a single hardware appliance implementing all necessary functionality, including a web-based administrative interface and web-based distribution of software. Network elements should recognize each other automatically and be included in the system without the need for complex network configuration of each element.

The system should be able to drive a total of 24 direct DVI inputs, 24 H.264 stream, 12 CVBS inputs onto the wall in any combination with each output of minimum 2560 x 1600 resolution, with an ability to save and recall any number of layouts to be displayed in any format on the large wall. The product should also be scalable in nature where the same controller should be able to stream 4K inputs on LAN by using an additional accessory. There should be virtually no limitation on the scalability, on the input/output requirements.

The total input and output requirement shall be configured **in more than one controller** i.e **atleast two controller** to meet all the requirements and avoid single point failure. The configuration shall be finalized during detail engineering.

Controller specifications:

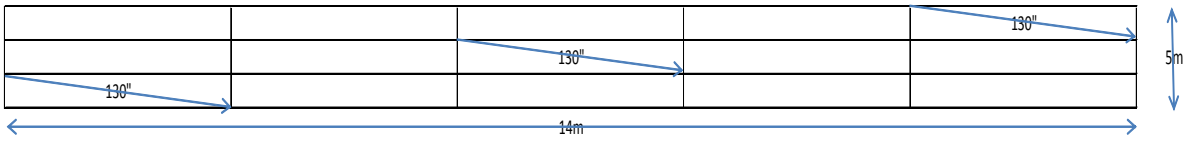
1.	Processor	8th Generation
2.	Quiet operation	Under <35dBA of generated noise for use in close proximity of users
3.	Mounting	19" rack mount
4.	Number of inputs	DVI/HDMI : 24 with each supporting resolutions of minimum 1920x1200 H.264 : 24 CVBS:12
5.	Streaming inputs	Should be capable of showing 24 streamed H.264 inputs on the screen, in any layout , size etc.
6.	Display configuration	Each display shall be configured as 130" diagonal display and for the 14 x 5 m size wall maximum of 15 displays shall be configured with 16:9 ratio. Each display shall have DVI and HDMI input
7.	Outputs	DVI,HDMI
8.	Transmission Distance	10-100 m
9.	Communication	CAT6
10.	MTBF (Mean Time Between Failures)	> 50,000 hours for major modules
11.	MTTR (Mean Time To Repair)	< 10 minutes for any major serviceable component
12.	HDCP compliant	Should be HDCP compliant for connection with IPads, bluray players
13.	Real time encoding	DVI signals to H.264 network streams, Level 5, High Profile support
14.	Dual USB interface for HID (KVM) control of DVI input sources	Supply of KVM link cable, to support connectivity and control of far end PC
15.	Operating systems	Linux, Windows
16.	Dual analog inputs, 1/8" mini-RCA	Should be able to stream audio along with video, for display on the wall
17.	DVI outputs	Resolutions up to 2560x1600 per output
18.	Diagnostic Capabilities	CPU usage, Network usage, Encoding and decoding usage, System temperature

19.	Operating Temperature	+10°C to +45°C
20.	Relative Humidity	15% to 80% non-condensing

Video Wall Management software

Video Wall management software shall be provided along with the system for configuration. The software shall have the following features.

- ✓ Web-based System Management
- ✓ Appliance status and management
- ✓ Network setup and management
- ✓ Display wall setup and management
- ✓ User setup and management
- ✓ Source setup and management
- ✓ Desktop Software Client, should be able to control all the nodes from a single location
- ✓ Support for Windows/ Linux systems
- ✓ Drag and drop interface
- ✓ Display Wall Simulator
- ✓ Pause and play control
- ✓ Snapshot and save to local disk
- ✓ Zoom and crop source content
- ✓ Desktop client layout support
- ✓ Only a single license shall be required, regardless of number of client seats
- ✓ Audio playback control
- ✓ KVM control of DVI, RDP and VNC sources Support for all system source types



Video wall Layout

LED tiles, controller and software from the same manufacturer to be provided for better performance.

Interfacing the video wall with the existing input sources is in Vendor's Scope. Any hardware/ extender-cable and software required for the same shall be in Vendor's scope. All cables for controls, power and interconnecting are in the scope of vendor.

9.10. Audio System

9.10.1. Speakers

Speakers are required and shall be mounted on the false ceiling of visitor's gallery and Command room. Number of speakers, type (Ceiling mount / Line array) & rating and mounting location will be finalized during detail engineering. Wiring for the speakers shall be done as per wiring standards and is under vendor scope.

- Specification of Ceiling Mount Speakers
  - ✓ Frequency Range (-10 dB) : 40 Hz - 20 kHz
  - ✓ Coverage (Conical) : 120°
  - ✓ HF Power Handling : 200 W Program
  - ✓ Sensitivity (SPL 1 W/1 m) : 88 dB Max
  - ✓ SPL : 108 dB Avg, 114 dB Peak
  - ✓ LF Transducer : 200 mm (8 in)
  - ✓ HF Transducer : 35 mm Compression Driver
  - ✓ Transformer Taps : 70V: 60W, 30W, 15W, 7.5W, 8 ohm
    100V: 60W, 30W, 15W, 8 ohm
  - ✓ Connectors : Removable locking 4-Pin (Phoenix)
  - ✓ wire size : 2.5 mm (12 AWG) max
  - ✓ Enclosure : ABS Plastic (UL94V-0) Baffle, steel back can
  - ✓ Grille : Color matched steel grille with fabric
  - ✓ Cutout Size : 294.3 mm (11.59 in)
  - ✓ Net Weight : 8.0 kg (17.6 lb)

- ✓ Support Hardware : C Ring, Tile Bridge
- ✓ Approvals : UL1480, 2043; C
- ✓ Make : Bosch, JBL

9.11. Furniture:

The operator chairs, visitor's galley chair shall be modern furniture type from reputed manufacturers. The make and model no of furniture shall be finalized at the time of detailed engineering.

Specification:

9.11.1. Operator Chair:

- Medium back rest height with breathable mesh backrest in Mesh fabric.
- Adjustable lumber support pad.
- 4 way adjustable armrest.
- Pneumatic seat height control.
- Synchronized mechanism for Tension Tit control.
- Multi position locking.
- Die cast Aluminum Base with chrome plated steel leg and wheels (5 nos)
- Die Cast Aluminum backbone.
- Make: Featherlite, MerryFair, Godrej

9.11.2. Visitors Gallery Chair:

- Self Tip Up Cushion Seat chair
- Centre distance (Arm-rest to Arm rest) shall be approx 22"
- Cushion bottom and back rear panels of heavy duty Materials
- Components: Type-0 All exposed & visible parts shall be painted
- Spring: For Auto Tip -up -Torsion Spring - Steel IS
- Mechanism: Roller & Ball Cage arrangement for Sliding Mechanism without any disturbing noise.
- Make: Featherlite, MerryFair, Godrej

9.11.3. Visitors Gallery VIP sofa:

- Single seat cushion Sofa
- Primary Material : Fabric
- Height : Approx 38″
- Width : Approx 28″
- Depth : Approx 34 ″
- Seating Height : Approx 18″
- Make : Featherlite, MerryFair, Godrej

  Fabric Color of furniture will be finalized during detail Engineering

Fixing of chairs in Visitors gallery is under the scope of vendor

10. ACCEPTANCE TESTS

10.1. Factory Acceptance Test (FAT):

- Vendor shall provide fabrication drawings. Pre-fabrication review to include a drawing submittal and complete components listing with samples of selected finish materials.
- The supplier shall demonstrate one sample console fully designed in all respects as per fabrication drawing for technical evaluation before manufacturing and assembly of all console.
- The change / modification suggested by the department shall be incorporated by the supplier without any additional cost.
- After obtaining clearance for the sample assembled console the supplier shall manufacture the remaining consoles.
- The department shall carry out Factory Acceptance test for the operator consoles at Manufacturer's Site before dispatch.
- The console shall be dismantled and transported to our place with proper international standard air worthy packing and control.

10.2. Site Acceptance:

- The department shall carry out site Acceptance test after the installation and commissioning of all the system at our site.
- The supplier shall demonstrate the system performance at site to comply all the specifications.
- Vendor shall measure and demonstrate the end results of acoustic i.e. Reverberation time < 0.6 sec in control room and visitor's Gallery by suitable measurements/simulations.
- After confirmation that all the requirements are met and found satisfactory, the department shall sign the Acceptance Certificate.

11. SPARES:

- The quoted video wall system shall have the capability of future augmentation of 10% in all respects.
- Spares shall be quoted @ 10% of the installed quantity for video wall panels.
- Offer shall contain the price of 10% spare for video wall panel.

12. PACKAGING & SHIPMENT:

- The supplier shall be responsible for packing the components in a manner that will ensure undamaged & complete arrival the destination.
- All panels, work surface and accessory elements part number shall be marked and packed in corrugated containers with protective material.
- All delivery instruction shall de confirmed before the packing of materials.

13. INSTALLATION & WARRANTY:

- The supplier shall install the supplied systems with proper installation procedures by either manufacturer or their authorized agents and to ensure proper installation practices as per the standard norms.

- The supplier shall provide a 1 year guarantee against defects of all component parts, material and workmanship under normal use.
- The spares shall carry a guarantee period of 18 months from the date of Site Acceptance Test.
- In case of any defects arise during installation due to improper installation practices, by vendors/ their representatives, the same have to be replaced/rectified at free of cost.
- Ten years warranty on structural stability for consoles, wall paneling and false ceiling.
- Five years warranty against any manufacturing defect on all modular/ removable system.
- Two years warranty on all the consumables like Ceiling light, MCB's, Video wall etc.

14. AMC:

- After completion of SAT and warranty period for maintenance of the video wall system contractor shall provide one service engineer full time at site for five years. The engineer shall be capable of handling both H/W as well as S/W of video wall system independently. The person shall be well qualified and trained person having experience in the same related field. The rate shall be quoted separately in the offer.
- Annual Maintenance Contract (AMC) for a period of 5 years include four preventive maintenance per year and any number of breakdown to be attended within 24 hours. AMC is non comprehensive.

15. BILL OF MATERIAL:

- It is mandatory to provide price breakup as per the price format

Table A : Price Format

Sl. No	Description	Unit	Qty	Unit Price	Total Price
A	**Video Wall**				
1	Supply of LED video wall and its related accessories	Lot	1		
2	Installation & commissioning of LED video wall	Lot	1		
B	**Interior Works**				
	Supply of Items:				
1	Printed Metal Panel in Visitors Gallery as per section 9.2.1	Sq .m	100		
2	Metal Panel in Visitors Gallery as per section 9.2.1	Sq .m	220		
3	Metal Ceiling in visitors Gallery as per section 9.1.3	Sq .m	300		
4	Calcium silicate ceiling in Visitors Gallery as per section 9.1.4	Sq .m	40		
5	Lattice Multilayered Metal Panel in Control room as per section 9.2.1	Sq .m	50		
6	Wall panel with back lit in Control room as per section 9.2.1	Sq .m	375		
7	Curved Metal paneling in control room as per section 9.2.1	Sq .m	260		
9	Baffle Ceiling in Control room as per section 9.1.2	Sq .m	250		
10	Calcium silicate ceiling in control room as per section 9.1.4	Sq .m	120		
11	Decorative Wall panel in Lobby as per section 9.3	Sq.m	120		
12	Doors	No's	6		
13	LED Light	Lot	1		
14	Switches, sockets & wiring	Lot	1		

15	Speakers	No's	30		
16	ACP Wall panel for exterior walls as per section 9.4	Sq.m	250		
	Erection & Commissioning				
17	Erection and commissioning of interior works and demonstration of acoustic performance	Lot	1		
18	Erection and Commissioning of ACP Wall paneling for exterior walls	Sq.m	250		
C	**Consoles:**				
1	Supply of Modular work station consoles	No's	36		
2	Installation of Modular work station consoles	No's	36		
D	**Chairs**				
1	Workstation Chairs	No's	70		
2	Visitor Gallery Chairs (Fixed)	No's	180		
3	VIP Chairs (Single Seat Sofa)	No's	40		
E	**Detail Engineering**	Lot	1		
F	**Annual Maintenance Contract (AMC) & local support for video wall and display system for a period of 5 years**	Lot	1		
G	**Spares for Video Wall**		1		
	Sub total				
	Taxes				
	Total				

- It is mandatory that vendors have to indicate and quote for any other item required for completion of the work which is not specified in the above list. Payment for the items will be done on pro rata basis for the actual.
- Payment will be made as per the actual quantity consigned to IPRC Mahendragiri. However, the quantity to be ordered shall be mutually agreed during Detailed Engineering.

16. COMPLIANE STATEMENT:

Nature of Requirement	Minimum Requirement Description	Compliance (Yes/No)	Deviation/ Remarks
Operator Consoles	Consoles must be designed for a full-time mission operations environment. The consoles shall be designed with ergonomic characteristics		
	Vendor should submit copy of ISO 9001:2008 Certification for last 2 years		
	Vendor should submit copy of Green guard certifications for consoles for last 3 years. This certification is for compliance with minimum indoor air quality standards.		
	Vendor should comply console manufacturing as per ISO 11064 for last 3 years		
	Reference to be provided for similar console installations with the above certifications		
Interior Works	Vendor shall provide reference for the proof of execution of similar interior works installation		
Video wall	Vendor shall provide reference for the proof of similar type of video wall installation. Performance certificate of the quoted brand also to be provided.		
General	Vendor/ Original Item Manufacturer (OIM) shall have successfully executed similar world class level orders for Control Room / Petrochemical industries / Automation sectors/ Mission Critical Application for total order value of 1000.00 Lakhs in the last five years. Reference to be provided.		

17. GENERAL CONDITIONS:

- The Vendor / Manufacturer shall go through all the specifications, instructions and terms & conditions and understand the requirements.
- Party shall consider all items required for erection and commissioning and for the successful completion of the work as per schedule.
- The designs/layouts attached with the specifications are only indicative and are provided to clarify the requirements. Vendor shall provide aesthetic designs meeting all the operational/functional criteria for the control room.
- Based on the designs submitted by the supplier, the department will evaluate and may suggest modifications and the supplier should be willing to accommodate such modifications during the evaluation.
- Based on the interior designs submitted by the supplier, the department will evaluate and finalize the proposal.
- Based on the console designs submitted by the supplier, the department will evaluate and decide the color, curvature, height, width of rear panel and other dimensions
- Detailed engineering works shall be carried out within 3 month after placement of order and submitted to department for approval. Based on the designs submitted by the supplier, the departments may suggest modifications. The modification suggested by the department has to be executed without additional cost.
- The manufacturer shall be a fully responsible for the manufacture of product including all design, metal work, woodwork and millwork to ensure product consistency and lead-time.
- All equipment consoles shall be constructed to within tolerances of 1/64'' for work surfaces and 0.020'' for metal components.

- The hardware additions required to meet the overall functional and technical requirements specifications during the course of detailed engineering shall be borne by the supplier at no additional cost.
- The period of completion shall be within 9 months from the date of ordering.
- All the electrical equipment used shall conform to the Indian Electricity Rules as regards safety, Earthing and other essential provisions specified therein for installation and operation of electrical parts.
- The technical information, drawings, specifications and other related documents forming part of PO are the property of the Department and shall not be used for any other purpose, except for execution of the PO. The technical information, drawings, specifications, records and other documents shall not be copied, transcribed, traced or reproduced in any other form or otherwise in whole and/ or duplicated, modified, divulged and/ or disclosed to a third party and/ or not misused in any other form whatsoever without the Department's consent in writing except to the extent required for the execution of this contract.
- All operating, maintenance and technical manuals, drawing and diagrams in English Language relevant to the system, subsystems and modules shall be provided by the supplier.
- The performance of the system shall be guaranteed by the supplier for a period of 12 month from the data of final acceptance of the system at the Department.
- References for similar projects shall be provided and site visits shall be arranged on demand.

ANNEXURE : B

TERMS & CONDITIONS

1. TERMS & CONDITIONS

1.1. ENTIRE AGREEMENT

- The Contract to be entered into shall convey the final agreement between the Department and the Vendor on the terms and conditions.
- In the event of conflicts between general conditions of Contract and the specification furnished by the Department, the latter will take precedence.

1.2. MODIFICATIONS IN THE CONTRACT

This Contract may be amended or modified only in writing signed by both the parties or their duly authorized agents or representatives by a change order issued by the Department and accepted by the Vendor, pursuant to the terms stated therein.

1.3. CANCELLATION OF CONTRACT

- The Department will have the right, at any time, to cancel the Contract either wholly or in part by giving written notice. The Vendor shall undertake to observe the instructions of the Department as to the winding up of the Contract both on his own part and on the part of his sub-vendors.
- In the case of cancellation of the Contract by the Department without any fault of the Vendor, the Vendor shall forthwith take the necessary steps to implement the Department's instructions. The period to be allowed to implement shall be fixed by the Department after consultation with Vendor and, in general, shall not exceed 3 months.
- The Department will, in no circumstances, be liable to pay any sum which, when added to the other sums paid, due or becoming due to the Vendor under the Contract and its amendments, if any, exceeds the Contract payment for the work set forth in the Contract and its amendments, if any.
- The ownership of all materials, part and unfinished work paid for by the Department under the provisions of this Section shall be vested in or transferred to the Department as soon as they have been paid for.

1.4. VENDOR'S DEFAULT LIABILITY

- The Department shall reserve the right to terminate the work in the circumstances detailed hereunder:
  - If the Vendor fails to rectify or replace any defective system/ sub-system/ equipment within a period of 60 days after the Department having given a notice to the Vendor to rectify or replace the said defective system/ subsystem/ equipment or the Vendor delays, suspends or is unable to complete the system/ subsystem/ equipment by the date mutually agreed upon
  - If the vendor commits breach of any of the terms and conditions of the Contract.
  - If the Government of India decides to terminate the Contract in public interest.
- When the Vendor makes themselves liable for action under the circumstances mentioned above, the Department will have power to forfeit the bank guarantee of Vendor and the Vendor shall have no claim for damages whatsoever on such forfeiture.
- The work remaining to be completed at the time of termination of the Contract shall be got executed through any other Vendor, in which case the expenses, which may be incurred in excess of sums, which would have been paid to the original Vendor, had the whole work been executed by them, shall be borne by the original Vendor and shall be recovered from them.

1.5. CHANGES AND MODIFICATIONS TO SPECIFICATIONS AND QUALITATIVE REQUIREMENTS

- The Department shall reserve the right at any time to modify the qualitative requirements, specifications, patents or drawings related to the work covered by the Contract. The Vendor shall inform to the Department within 30 days, of any objections they have to the modifications required.

- The Department may also accept the modification proposed by the Vendor on his own initiative or on behalf of sub-vendors or as a result of detailed engineering review.
- When a modification or other change is so authorized, the Vendor shall proceed with action in accordance with the Department's direction. They shall moreover, as soon as possible after the receipt of such directions, submit to the Department a firm and detailed estimate showing any decrease or increase in the cost entailed by the modifications and any effect its introduction will have on the delivery schedule.
- Any amendment to the Contract which may be necessary in this respect will be established within a reasonable time in the form of amendment to Contract, to be signed by both the parties. If the parties do not agree on the amendments to the Contract, in particular regarding prices, responsibility, delivery schedule etc, dispute shall be submitted to arbitration.

1.6. SUB-CONTRACTING

The Vendor shall not assign or sub-contract the work or any part of the work without the written approval of the Department. In the event of approval of sub-vendors, the detailed specifications and drawings of sub-contracted items shall be approved by the Department. All the works carried-out by such sub-vendors shall also be scrutinized, inspected and approved by the Department. However the responsibility of such sub-contracted systems shall lie with the Vendor. Any delay in carrying out the work by the sub-vendor which affects the overall schedule of the work does not absolve the Vendor from payment of compensation for the delays. All terms and conditions applicable to the Vendor shall also be applicable to sub-vendor.

1.7. COMPLIANCE WITH STANDARDS

All the materials supplied or used shall be of new and first quality and manufactured and tested in accordance with the latest editions of the relevant Indian/ International standards. Wherever imported components are used, they shall be manufactured in accordance with the relevant standards

published in the country of manufacture after allowing for specific aspects under Indian conditions such as tropical climate, etc. Any material or work, where no specific standard is applicable, shall be fabricated as per the instructions and directions of the Department.

All the electrical equipments used shall conform to the latest Indian Electricity rules as regards safety, earthing and other essential provisions specified therein for installation and operation of electrical parts.

1.8. SECRECY

The technical information, drawings, specification and other related documents forming part of enquiry or Contract are the property of the Department and shall not be used for any other purpose, except for execution of the Contract. All rights, including the rights in the event of grant of a patent and registration of designs are reserved. The technical information, drawings, specifications, records and other documents shall not be copied, transcribed, traced or reproduced in any other form or otherwise in whole and/ or duplicated, modified and/or disclosed to a third party and/or not misused in any other form whatsoever without the Department's consent in writing except to the extent required for the execution of the work. This technical information, drawings, specifications, records and other documents shall be returned to the Department with all approved copies and duplicates, if any, immediately after they have been used for the agreed purpose.

1.9. INSPECTION OF WORK

- The Department or any person appointed by it shall have access and right to inspect the work, or any part thereof, at all times and places during the progress of the work. The inspection and supervision is for the purposes of assuring the Department that the plans and specifications are being properly executed and while the Department and its representative(s) will extend to the Vendor all desired assistance in interpreting the plans and specifications, such assistance shall not relieve the Vendor of any responsibility for the work. Any work which is proved faulty shall be

corrected by the Vendor without delay. The fact that faulty work or work which is not in accordance with plan and specifications was not pointed out by the Department will not relieve the Vendor from correcting such work as directed by the Department without additional compensation.

- The Department's representatives shall at all reasonable times have free access to the works and/ or to the workshops, factories or other places where materials are being prepared or fabricated for the work and also to any place where the materials are lying or from where they are being obtained, and the Vendor shall give every facility to the Department's representatives for inspection and test of the materials and workmanship even to the extent of discontinuing portions of the work temporarily or of uncovering or taking down portions of finished work.
- The Department has no obligations to discover defects patents or otherwise and it shall be the sole responsibility of the Vendor. The inspection and clearance for dispatch by Department's representatives shall not absolve the Vendor's obligations and duties under terms and conditions herein.

1.10. CO-ORDINATION WITH OTHER VENDORS AND INTERFACING OF THE WORKS

The Vendor shall extend all co-operation to other Vendors of the Department to perform their works at site simultaneously. The Vendor shall so arrange their activities so as to ensure smooth and timely execution of the project, minimize interference with the works of the other Vendors and allow the other Vendors to use the facilities engaged by them for erection activities. For this purpose, the Vendor shall plan such works and indicate such interfaces in an interface schedule. They shall not be entitled to any extra payment on this account.

1.11. FORCE MAJEURE

If at any time during the execution of the Contract, the performance in whole or in part by either party of any obligation under the work is prevented or delayed by reasons of any war, hostility, acts of the public enemy/terrorist, civil commotion, sabotage, fire, flood, earth quake, epidemics, quarantine restrictions, strikes, lock-outs, or acts of God (hereinafter referred as

Eventualities) and if notice is given by either party to the other within 21 days from the date of occurrence thereof, neither party shall for such eventuality be entitled to terminate the work nor shall any party have any claim for damages against the other in respect of such non-performance or delay in performance. The performance under the work shall be resumed as soon as practicable after such eventualities have come to an end and the decision of the Department whether the performance has been resumed or not shall be final and conclusive.

Provided further that if the performance in whole or in part of any obligation under the work is prevented or delayed by such eventuality for a period of exceeding 60 days, the Department may at their option terminate the Contract provided also if the work is terminated under this clause, the Department will be at liberty to take over from the Vendor at a price fixed by the Department which shall be final. All unused, un-damaged acceptable materials, bought-out components lying in stores in course of erection and commissioning in the possession of the Vendor at the time of such termination of such portion thereof as the Department may deem fit excepting such material, bought-out components lying in stores as the Vendor may with the concurrence of the Department elect to retain.

1.12. INDEMNITY TO DEPARTMENT AGAINST INFRINGEMENT OF LABOUR LAWS

The Vendor shall indemnify the Department against any action, claim or proceedings relating to infringement of all or any of the prevailing labour laws of India like Workmen's Compensation Act 1923, Work Labour (Regulation and Abolition), Central Rules 1971, Employees Liability Act 1938, Industrial Disputes Act 1947, Employees Provident Funds and Miscellaneous Act 1952 as amended from time to time during erection and commissioning at Department's site.

1.13. PATENT RIGHTS

The Vendor shall fully indemnify the Department against any action, claim or proceedings relating to infringements or use of any patent or any design or any alleged patent or design rights and shall pay any royalty which may be payable in respect of any claims made under or any action brought against the Department. In respect of such matters as aforesaid, the Vendor shall be set at liberty, at their own expense, to settle any dispute or to conduct any litigation that may arise there-from. The Vendor shall not be liable to indemnify the Department on the infringement of the patent or design or any alleged patent or design right which is the direct result of an order passed by the Department.

1.14. ARBITRATION

Except matters in respect of which the decision of the Department is final as specified in the Contract, any dispute, disagreement or question arising out of or relating to or in consequence of the work or fulfilment or the validity of the enforcement thereof which cannot be settled mutually, shall within 30 days from the date that either party informs the other in writing that such dispute or disagreement exists, be referred to arbitration. The Arbitrator shall be a serving Law officer of the rank of Joint Secretary to the Government of India and shall be nominated by Director, IPRC. The award of the Arbitrator so appointed shall be final and binding on the parties to this Purchase Order. The arbitration proceedings shall be in compliance with the Arbitration and Conciliation Act 1996. The performance under this work shall continue during the arbitration proceedings and no payment due or payable by the Department will be withheld unless any such payment is or forms part of the subject matter of the arbitration proceedings. All expenditures towards arbitration will be equally shared by both the parties.

1.15. ASSIGNMENT

The work shall be binding upon the successors and the assignees of the parties hereto. It shall not be assigned in whole or in part by either party without prior written consent of the other. If the Vendor becomes insolvent or being a firm or a company whether incorporated or not is dissolved or goes into bankruptcy or

is caused to be wound up except for re-construction purposes or carried on its business under a receiver, the representatives in law of estate of the Vendor or any such receiver, liquidator or any person in whom the agreement may be vested shall forthwith give notice thereof in writing to the Department and shall remain liable for the successful performance of the Vendor or the successors of their obligations under this Contract under any circumstances.

1.16. JURISDICTION AND APPLICABLE LAW

The work shall be governed by the laws of India for the time being in the force. The courts of the Tirunelveli, Tamil Nadu state only shall have jurisdiction to deal with and decide any legal matters or dispute whatsoever arising out of the work.

1.17. EXECUTION OF WORK

The specifications of the work are intended to describe and provide for a complete finished system. It is to be understood and agreed by the Vendor that the work described shall be complete in every detail, even though every item necessarily involved is not particularly mentioned. The Vendor shall be required to provide all labour, materials and equipments necessary for the completion of the work described and shall not avail themselves of any manifesting unintentional error, omission or inconsistency that may exist. The Vendor shall carry out and complete the work in every respect in accordance with the Contract and the directions and to the satisfaction of the Department.

1.18. RIGHTS OF THE DEPARTMENT

- Right to illustrate and explain plans

a. The various parts of the Contract are intended to be complementary to each other but if any discrepancies appear or any misunderstanding arises, the explanation of the Department will be final and binding.

b. The corrections of any errors or omissions of specifications may be made by the Department, when such correction is necessary to bring out clearly the intention which is indicated by a reasonable interpretation of the specifications as a whole.

c. Wherever in the specifications which are a part of the work or which may be furnished to the Vendor for directing the work, the terms and descriptions of various qualities of workmanship, materials, structures, processes, plant or other features of the work are described in general terms, the meaning of fulfillment of which must depend upon individual judgments, then in all such cases, the question shall be decided by the Department and said material shall be furnished, said work shall be done and said structure or feature shall be constructed, furnished or carried out in full and in accordance with their interpretation of the same and to their full satisfaction and approval, provided such interpretation is not in direct conflict with the specifications or generally accepted good practice.

- RIGHT TO DIRECT WORK

a. The Department will have the right to direct the manner in which all work under this Contract shall be done, in so far as it may be necessary to secure the safe and proper progress and the specified quality of the work and all work shall be done and all material shall be furnished to the satisfaction and approval of the Department.

b. Whenever, in the opinion of the Department, the Vendor has made marked departure from the schedule of completion laid down in the Contract or when untoward circumstances force departure from the said schedule, the Department in order to assure compliance with the schedule and the provisions of the work, shall direct the order, pace and method of doing the work, which shall be adhered to by the Vendor.

c. If, in the judgment of the Department, it becomes necessary at any time to accelerate the overall execution of the work, the Vendor when ordered and directed by the Department will cease the work at any particular point and transfer their men to such other point or points and execute such portion of their works, as may be required, to enable others to hasten and properly engage and carry on their work, as directed by the Department.

d. The work by the Vendor at the site beyond normal working hours (08:45 to 17:15 hr) on working days and any time on holidays (including Saturdays

and Sundays) shall be permitted only with prior approval of the Department. The Department may also direct the Vendor to operate extra shifts over and above normal day shift to ensure completion of the work on schedule if, in the opinion of the Department, such work is required.

1.19. VENDOR'S FUNCTIONS

- The Vendor shall provide everything necessary for proper execution of the work according to the intent and meaning of the specifications whether the same may or may not be particularly shown or described therein, provided that the same can reasonably be inferred there-from and if the Vendor finds any discrepancy there-in, they shall immediately and in writing refer the same to the Department whose decision shall be final and binding on the Vendor.
- In the execution of the work, no person other than the Vendor, or their duly appointed representatives, their sub-vendors, and their workmen, shall be allowed to work at the site except by special permission, in writing by the Department.
- The Vendor shall proceed with the work to be performed under this Contract and each and every part and detail thereof, in the best and most workmen-like manner by engaging qualified, careful and efficient workers and to the several parts thereof at such time and in such order as the Department directs and finish such work in strict conformance with the drawings and/or specifications and any changes, modifications thereof made by the Department.
- The Vendor's personnel shall not be permitted to reside inside the Department's premises after the work. The Vendor shall arrange for transportation, accommodation, food, health care, communication, etc. for their personnel.
- In respect of observance of local rules, administrative orders, working hours and the like, the Vendor and their personnel shall co-operate with the Department.

1.20. SUPPLY OF TOOLS, AND OTHER MATERIALS

- For full completion of the work, the party shall, at their own expense, furnish all erection tools, power tools, cables, wiring tools, test instruments, and all associated protective equipments, appliances, materials required to accomplish

the work under the contract unless otherwise provided for. Adequacy of such tools shall be subject to final determination of the Department.

- The party shall not dispose, transport or withdraw any tools, equipments and materials provided by them for the contract without taking prior written approval from the Department and the Department at all times shall have right to refuse permission for disposal, transport or withdrawal of tools, equipment and material if in their opinion, the same will adversely affect the efficient completion of the work.
- The Vendor shall also furnish all necessary expendable devices like anchors, grinding and abrasive wheels, plugs, hacksaw blades, taps, dies, drills, reamers, chisels, files, carborundum stones, wire brushes, necessary scaffolding, ladders, wooden planks, timbers, sleepers, and consumable materials like oxygen, acetylene, argon, lubricating oils, greases, cleaning fluids, cylinder oil, graphite powder and flakes, fasteners, gaskets, temporary supports, stainless steel shims or various thicknesses as required, cotton waste, PTFE tapes and all other miscellaneous supplies of every kind required for carrying out the work under the contract.

1.21. PROTECTION OF WORK

- The Department will not be responsible or held liable for any damage to person or property consequent upon the use, misuse or failure of any fabrication tools and equipment used by the Contractor or any of their sub-contractors.
- The Contractor shall effectively protect all the works from action of weather and from damages or defacement and shall cover finished parts where required for their thorough protection.
- The Contractor shall cover the work by a Contractor's all-risk policy during the currency of the contract.

1.22. SITE PERSONNEL

The party shall identify a Site Supervisor and he/ she shall be personally present to supervise the work under the contract. The Site Supervisor shall have full technical capability and complete administrative and financial powers

to expeditiously and efficiently execute the work under the contract. Any written orders or instructions which the Department may give to the party's Site Supervisor shall be deemed to have been given to the party.

1.23. FIRST AID

The Vendor may have access to the Departments' qualified first aid personnel and ambulance in case of accidents, subject to the availability of the same. However, the Vendor shall make his own medical and transport arrangements to take care of his employees in case of accident. The Vendor shall provide a first aid kit at the work site to meet the requirements of minor injuries.

1.24. REPORTING

The Vendor must report the following information to the Department by the end of every week during the work at Department's site.

a) Progress achieved
b) Expected dates for completion of individual works
c) Any actual or likely delay in the execution of work

1.25. WORKING AND SAFETY REGULATIONS

The Vendor shall observe all statutory and legal requirements enforced by Central and State Government applicable to the work as well as any local regulations applying to the site issued by Department or any other authority. Particular attention is drawn to the following

a) In case of accident, the Department shall be informed in writing forthwith. The Vendor shall strictly follow the regulations laid down by the Factory Inspector, Central and State Government authorities in this regard.
b) Compliance with all electricity regulations.

1.26. ELECTRICAL SAFETY REGULATIONS

In no circumstances will the Vendor interfere with fuses and electrical equipment belonging to the Department or other Vendors. Before the Vendor connects any electrical appliance to any plug or socket belonging to other Vendor or Department, he will

a) Satisfy Department that the appliances are in good working condition

b) Inform the Department of the maximum current rating, voltage and phase of the appliance

c) Obtain permission of the Department detailing the sockets, to which the appliance may be connected

1.27. POWER

Electricity will be supplied at free of cost. Contractor must provide power supply distributor with isolator for taking power for his equipments. Contractor should obtain Electrical safety clearance from CMG/IPRC and safety clearance from safety division before starting the work.

1.28. WATER

Free supply of water will be made available by the Department.

1.29. CLEAN-UP OF WORK SITE

The party shall not store or place the equipment, materials or erection equipment on the drive ways and streets and shall take care that their work in no way restricts or impedes traffic or passage of men and material. All waste materials are to be disposed off safely to the location specified by the department

1.30. SAFETY AND RELIABILITY

- Since the systems are highly complex in nature, the philosophy and criteria to be adopted shall be highly safety-and-reliability-oriented for their systematic and proper functioning. The designs of the sub-systems, components, equipments to be carried out by the Contractor shall specifically address essential safety provisions both in-built and external. Reliability is a prime factor, which has to be embedded in the process of realization of the systems. To ensure that the sub-system design, development, selection of equipment, components, material, etc are in compliance with the standard engineering practices, it is necessary to follow established design codes and standards.

- **SECURITY DEPOSIT**

The Supplier shall deposit an interest free amount equivalent to the 10% (TEN PERCENT) of the total order value towards Security Deposit for the due

performance of the Purchase Order within 30 days from the date of Purchase Order. The Security Deposit can be submitted either in the form of (a) Demand Draft drawn in favour of Accounts Officer, IPRC, (b) Bank Guarantee in Rs.100/- Non-judicial Stamp Paper obtained from any Nationalized/Scheduled Bank and (c) Term Deposit Receipts duly endorsed by the respective Banks in favour of IPRC. This security deposit shall be returned to the Supplier only upon successful completion of all the contractual obligations or shall be adjusted / forfeited against non-fulfilment of any of the contractual obligations.

1.31. QUALITY ASSURANCE

The reliability of Instrumentation is a combination of specification of the equipments/ components, serviceability and maintenance of the same, which are meant to serve and provide effective and timely operation, which includes trouble-free performance of systems and sub-systems to the intended specifications.

The Contractor must look for the quality factors individually attributed to engineering developments, selection of equipments and components, test and acceptance procedures followed, repetitive performance achieved, risk analysis carried out, etc. each and every module must be manufactured and tested to international Quality Control standards. The test certificates shall be provided to Department.

The quality assurance is an unified approach that attempts to control the quality right from design stage to commissioning stage, which includes the checking of the adequacy of the equipments/ components for materials, fabrication, installation, testing. It is the combined responsibility of the Contractor and the Department to ensure that all possible failure modes are exercised and validated during FAT.

1.32. PURCHASE OF MATERIALS

The selection of equipments, components, materials, etc. with appropriate and suitable specifications shall be the responsibility of the Vendor, as overall performance of the system rests with the Vendor. Accordingly, the selection

and purchase tasks shall be handled by the Vendor immediately after the approval of Detailed Engineering documents by the Department.

The criteria for selection of particular product and the reasoning involved therein shall be submitted to the Department for necessary approval. However Department's decision will be final.

For the goods of foreign origin, if any, the Supplier/their Supplier shall arrange Export License.

The Department will provide necessary end-use certificate for obtaining the required license for import of items if requested by the Contactor.

In keeping with the terms of the Contract, the Vendor shall undertake the responsibility for handling, packaging and transportation involved to the accepted level of any sub-systems/ equipment covered by the work in the Contract.

- EMPLOYMENT OF LABOURS

  The vendor shall deploy Indian National only for execution of the work.

  Only skilled employees with experience of this particular work shall be employed.

  No person below the age of 18 years shall be employed.

  The Supplier shall pay to each person, wages not less than those specified by Minimum Wages Act.

  The employees / labour, for carrying out all the site works shall be identified well in advance by the vendor and necessary approval shall be obtained from the Department for entry permit to the work site.

- GATE PASS

  For Vendor's equipment, tools, materials, etc. which are to be taken out from IPRC, Mahendragiri campus after completion of work, proper entry shall be made at the main gate duly endorsed by CISF. The Department shall issue necessary gate passes for taking out the Vendor's materials, as and when required and after completion of work.

2 INSTRUCTIONS TO BIDDERS

The proposals are invited as sealed quotations on behalf of the President of India by the Head, Purchase & Stores, IPRC, Mahendragiri, from reputed Vendors of high competence for the following work for IPRC, Mahendragiri, Tirunelveli District, Tamil Nadu State, India.

2.1 SCOPE OF WORK

The scope of the work includes Design, 3D rendering, Detailed Engineering, Procurement, Supply, erection & commissioning of Test Control Centre Consoles, Video wall, acoustic proof interiors as per the specification given in this document. The bidder is required to submit quotation for the entire works mentioned herein. The incomplete quotations shall be summarily rejected. The deviation, if any, in the bidder's proposal with respect to this document shall be explicitly mentioned in the schedule of deviations to be provided in the quotation. If the bidder does not mention any deviation, it shall be construed by the Department that the bidder agrees to comply with each and every aspect of this document.

2.2 EXECUTION PERIOD

The total delivery period, reckoned from the date of award of the purchase Order to the data of commissioning and final acceptance of the system, shall be 9 months as detailed below:

Sl. No	**Score of work**	**Period**	**Responsibility**
1	Detailed Engineering and acceptance by Department	Within 3 Months from the release of Purchase order	Supplier & Department
2	Supply of all items to site	Within 5 Months from the release of Purchase order	Supplier
3	Erection and commissioning at site	Within 8 months from the release of Purchase order	Supplier
4	Site acceptance test	Within 9 months from the release of Purchase order and acceptance of system	Supplier

2.3 COMPENSATITION FOR DELAY

If the contractor fails to complete execution of the contract or fails to meet delivery specified in the contract or any extension thereof, the Department will recover from the Contractor as Liquidated Damages (LD) a sum of 0.5% of the total contract price for each calendar week of delay or part thereof. The total liquidated damages shall not exceed 10% of the contract price.

2.4 DELIVERY TERM

All equipments/materials to be supplied by contractor shall be delivered at IPRC, Mahendragiri. The party shall be responsible for further transportation of items to erection site. Further responsibility of handling and storage of all items lies with the vendor.

2.5 LANGUAGES AND MEASURES

All documents pertaining to the Contract including specifications, schedules, notices, correspondence, operating and maintenance instructions, drawings or any other writings shall be written in ENGLISH Language only.

2.6 DOCUMENTS

All operating, maintenance and technical manuals, drawings and diagrams in English Language relevant to the systems/components shall be supplied by the Contractor.

2.7 GUARANTEE

a) The "Defect Liability Period" shall be 12 months from the date of successful completion of commissioning the system. The work shall not be considered as completed until the Department has certified in writing that they have been actually accepted and the Defect liability period shall commence from the date of such certificate.
b) The equipments & material supplied by the vendor shall carry a guarantee for a period of 12 months from the date of commissioning, against any material defect, design defect, manufacturing defect and/or failure of equipment to perform, as stipulated.

c) In case any defect in the work due to bad materials, and/ or bad workmanship develop in the work before the expiry of the period, the Contractor, on notification by the Department, shall rectify or remedy the defects at their own cost and shall make their own arrangements to provide materials, labour, equipment and any other appliances required in this regard.

d) The equipments, or components repaired or replaced by the Contractor shall be guaranteed for a period of 12 months from the date of repairs or replacement.

e) The Contractor shall furnish performance guarantee in the form of bank guarantee to the extent of 10 % of the total contract value, valid for sixty days beyond warranty period. If any defect is noticed by the Department during the defect liability period and Contractor fails to rectify or remedy the defects, the Department will have the right to get this done by other agencies and recover the cost incurred, as determined by the Department, which shall be final and binding, by recovery from the amounts due to the Contractor and/ or by invoking bank guarantee.

2.8 INSURANCE

The contractor should take all necessary steps including insurance cover till the system are dispatched & delivered at purchaser's site.

2.9 PACKING

The contractor shall pack all the equipments, materials and its accessories and make the identification names at the top of each pack. Proper packing shall be done so as to ensure that the items are not damaged during transportation.

2.10 FORM OF QUOTATION

The quotation shall be submitted separately for

a. Technical and commercial (without price)
b. Price

The first shall contain the technical and commercial aspects which will be opened first. The price quotation will be opened only after the evaluation of the technical and commercial bid.

All documents (including the drawings) issued in this tender enquiry shall be returned along with the quotation. The bidder not quoting for this enquiry shall return the tender documents (including the drawings) to the Head Purchase & Stores, IPRC, Mahendragiri within 15 days from due date of opening.

All corrections shall be attested by initials of the bidder with date.

The Department reserves the right to reject any or all quotations in whole or part without assigning reasons thereof.

2.11 PRICES

The bidder shall quote **firm and fixed prices** valid during the execution of the Contract till commissioning and final acceptance of the systems to the satisfaction of the Department. The prices shall include all taxes, levies like octroi, duties, taxes, royalties, permits charges, etc. levied by any central, state, local or other Governmental authority, which the Vendor is required to pay in any country as well as in India with reference to fabrication, purchase, transportation up to the delivery point stated in this document.

The bidder shall provide the individual item wise break-up prices as given in Table: A (Price format).

2.12 PAYMENT

Payment will be made as per the actual quantity consigned to IPRC Mahendragiri. However, the quantity to be ordered shall be mutually agreed during Detailed Engineering.

Milestone payments: Milestone payment will be considered as follows:

- **For supply portion**
  - 80% of supply price shall be released within 30 days against receipt and acceptance of item at IPRC, Mahendragiri.
  - 20% of supply price after satisfactory completion of commissioning of all activities.

- **For erection portion**
  - Among 80% of erection price, 20% shall be released after approval of detailed engineering documents and 60% shall be released on pro rata basis for the completed erection works.
  - 20% of erection price after satisfactory completion of commissioning of all activities on submission of PBG.

2.13 VALIDITY

The quoted price should be valid for a period of **6 months** from the date of opening of the technical and commercial quotation.

2.14 TAXES AND DUTIES

a. Department will reimburse all taxes and duties at actuals for the materials which are directly consigned to IPRC, Mahendragiri and for the services provided by the Contractor against documentary evidence.

b. Forms C or D for concessional rate of CST for interstate purchase will not be issued by the Department.

c. The statutory deductions on account of Income tax shall be made as per the extant provisions contained in the Indian Income Tax Act, 1961 and tax deducted-at-source certificate will be issued to the Contractor.

d. Excise Duty Exemption Certificate will be provided by Department only for those indigenous items consigned to IPRC Mahendragiri against proforma invoice submitted by the Contractor only and not by the sub-Contractor.

e. Custom Duty Exemption Certificate will be provided by Department for those imported items consigned to IPRC Mahendragiri against proforma invoice submitted by the Contractor/Sub-vendor.

2.15 QUANTITY VARIATION OF ITEM

The exact quantity and the list of items required for commissioning will be finalized during detailed engineering and 10% quantity variation shall be permitted for supply and erection part of contract.

2.16 PRE-BID MEETING

Within 2 weeks from date of floating of tender, it is proposed to brief all interested bidders on the requirements of this document at IPRC, Mahendragiri and the exact date will be intimated after tendering. Bidders interested to participate in the pre-bid meeting shall communicate their willingness in writing to Head, Purchase & Stores immediately on receipt of this document. **Tender of a firm who have not attended the pre-bid meeting will be disqualified.**

2.17 BIDDER'S PROFILE

The bidder shall elaborately bring out in their **techno commercial offer**, their company profile, which shall be commensurate with the level demanded for the execution of the work specified in this document. **Department has right to reject the proposals which are in-complete or found unsuitable based on the details requested below.**

a. Infra-structural facilities such as factory area, machineries, equipments, material handling devices, instruments, tools, tackles, etc
b. Human resource inventory under the categories such as executives, managers, engineers, supervisors, foremen, technicians, unskilled laborers, clerical staff, auxiliary staff, etc. The educational qualification, expertise and experience of the key staff shall also be submitted.
c. Financial soundness, specifying the annual turn-over, annual income tax paid, pre audited balance sheet, name of the banker, etc shall be submitted to support the following requirements.
    - The average annual financial turnover during last three years ending 31.03.2016 shall be 4.0 crore.
    - The company must have made profit in at least 3 years out of 5 years ending 31.03.2016 as per audited balance sheets.
d. Minimum 5 years experience in executing similar control room works is required. Supporting documents indicating previous experience in execution of projects of the nature and quantum on par with those specified in this document shall be submitted.

e. References of successful execution and completion of similar world class projects for Control Room / Petrochemical industries / Automation sectors/ Mission Critical Application areas for total order value of 1000.00 Lakhs in the last five years to be provided.

f. Clientele, specifying the clients to whom they have executed works of nature similar to that specified in this document. The address, telephone, fax, E-mail and contact person of the clients shall also be specified.